

The Past Decade of Tsukuba 32-m VLBI Station

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Abstract. Tsukuba 32-m VLBI station is operated by Geographical Survey Institute (GSI) VLBI group. The station was constructed in 1998, and GSI has been participating a lot of sessions and performing various experiments with the station. This report summarizes the past decade of the station.

1. 1998–2002

Before 2000, GSI had participated in domestic / international observations with Kashima 26-m antenna. In 2002, Kashima 26-m (Fig. 2) was dismantled because it became too old for work, and Tsukuba 32-m (Fig. 1) became a target of the azimuth from origin for horizontal coordinates in Japan (Fig. 3). Tsukuba 32-m has been participating in various geodetic VLBI observations as the key station of GSI VLBI network (Tabl. 1).



Figure 1. Tsukuba 32-m antenna



Figure 2. Kashima 26-m antenna

Table 1. Event Calender of Tsukuba 32-m VLBI Station

Year	Events
1998	<ul style="list-style-type: none"> – The Tsukuba 32-m VLBI station constructed with K4/Mark 4 equipments. – Opening ceremony.
1999	<ul style="list-style-type: none"> – The height of the antenna had changed +43.7 mm because of the AZ rail replacement.
2000	<ul style="list-style-type: none"> – Japan-Tie sessions (Kashima 26-m, 34-m and Tsukuba 32-m).
2001	<ul style="list-style-type: none"> – 1st co-location observation.
2002	<ul style="list-style-type: none"> – Dismantlement of Kashima 26-m antenna. – Revision of survey act (Tsukuba 32-m became a target of the azimuth origin).
2003	<ul style="list-style-type: none"> – Tsukuba 32-m installed high-speed optical fiber network “Super-SINET”.
2004	<ul style="list-style-type: none"> – Contribution to Mars Exploration Rover Mission.
2005	<ul style="list-style-type: none"> – Installation of K5/VSSP system. – Start of the observations using the K5/VSSP system. – Discarded magnetic tapes and tape recorder. – Contribution to Deep Impact mission. – CONT05.
2006	<ul style="list-style-type: none"> – Installation of K-band receiver by Tsukuba University.
2007	<ul style="list-style-type: none"> – A insulator panel of Tsukuba 32-m was broken by strong wind. – Installation of K5/VSSP32 system with USB interface. – Success of ultra rapid dUT1 experiment (Onsala-Tsukuba).
2008	<ul style="list-style-type: none"> – 2nd co-location observation. – CONT08 (Plan).

GSI VLBI Group performed co-location observation to determine the relative position of GPS-based control station to Tsukuba 32-m antenna (Fig. 4).

2. 2003–2005

Tsukuba 32-m is engaging e-VLBI observations for IVS-INT2 and submits weekend observation database on Monday. This short latency had contributed to the success of Deep Impact mission by providing the newest UT1 parameter (Fig. 5).

Tsukuba 32-m has established a semi-unmanned observation system, utilizing K5/VSSP system to directly record the data on linux format and to check raw observation data (Fig. 6).



Figure 3. Target of Azimuth from Horizontal Origin Point

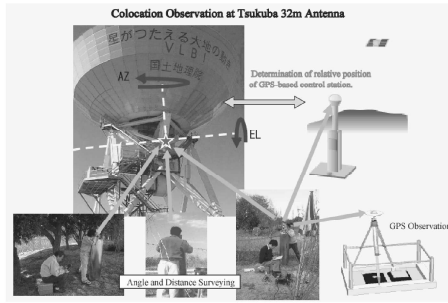


Figure 4. Colocation Observation



Figure 5. Deep Impact Mission

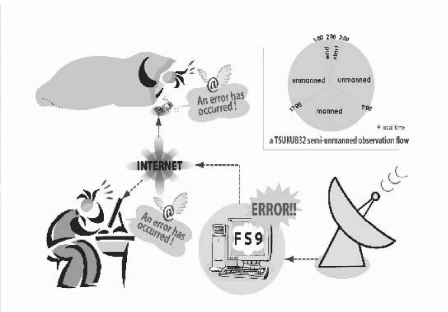


Figure 6. Observation System

3. 2006–2008

One of the insulator panels of the antenna was broken by strong wind and fell down to the ground on Jan. 3, 2007. After that, we implemented an overall check of the antenna.

Tsukuba 32-m has implemented experiments for Ultra Rapid UT1 measurement. The purpose of the experiment is to obtain the UT1 result within 30 minutes after the end of the last scan in the experiment. We succeeded in obtaining the UT1 result within 4 minutes after the experiment with ONSALA60 in Feb. 21, 2007.

4. Recorder Transition

So far, Tsukuba 32-m has changed the VLBI recorder 3 times (Fig. 7). The 1st recorder is K4/Mark 4 which recorded the observation data in magnetic tapes. The 2nd recorder is K5/VSSP which recorded the data as linux file, so we could check easily whether recording data was success. Now, we use K5/VSSP32 which enables us to record the data in 64 Mbps/ch (Total 1024 Mbps) with USB interface between the sampler and the hard disk.

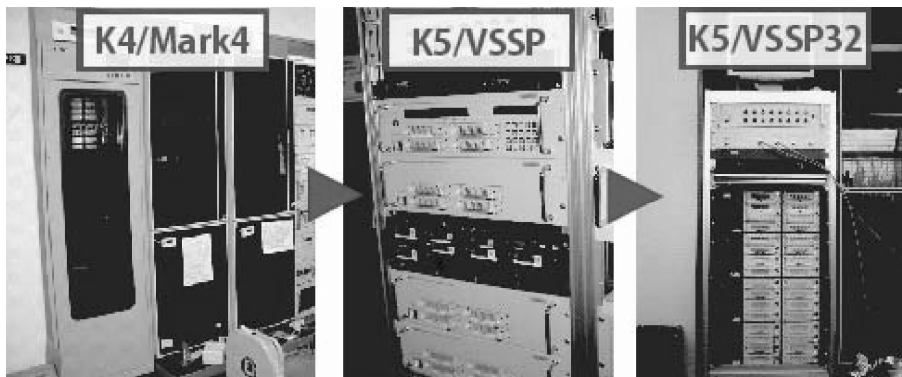


Figure 7. Recorder Transition of Tsukuba 32-m

5. Regular Sessions at Tsukuba 32-m

Tsukuba 32-m has participated in a lot of domestic and international sessions every year. The number of the sessions has steadily increased (Fig. 8). In 2007, the number reached 161 sessions. We plan to participate in about 190 sessions in 2008.

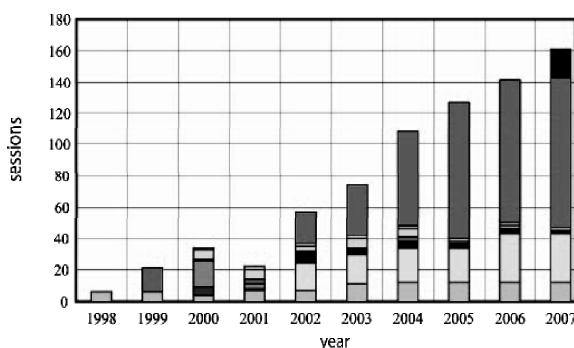


Figure 8. Regular Sessions at Tsukuba 32-m

References

- [1] Fujisaku, J., K. Kokado, K. Takashima. Tsukuba 32 m VLBI station. IVS 2005 Annual Report, 2005.
- [2] Kokado, K., J. Fujisaku, K. Takashima. Tsukuba 32 m VLBI station. IVS 2006 Annual Report, 2006.